ANDHRA PRADESH SOLAR POWER CORPORATION Pvt. Ltd
(A J V COMPANY OF GOVT OF ANDHRA PRADESH AND GOVT OF INDIA)

TADEPALLI: GUNTUR DISTRICT

NOTICE INVITING TENDERS (NIT) NO.

APSPCL-e-E- 15/2020-21/EE/Tech/APSPCL, Dt.29.09.2020

For

Name of Work: APSPCL – Design, Engineering, Manufacturing, Supply, Supervision of erection, testing and commissioning of 8 Nos. 80MVA, 220/33kV Power Transformers along with 2 set of spares for 220/33kV Pooling Stations- 2&3 at Kadapa Ultra Mega Solar Park (1000 MW), Mylavaram, Kadapa District, A.P.

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TENDER SPECIFICATION

Consisting of
PREQUALIFICATION REQUIREMENTS, INSTRUCTIONS TO TENDERERS, TERMS & CONDITIONS OF CONTRACT

GENERAL REQUIREMENTS

TECHNICAL SPECIFICATIONS AND SCHEDULES

Executive Engineer/Tech
4th Floor, Garuda Enclave APSPCL,
Tadepalli, Guntur District - 522 501
Ph: - 08645-274040/41/42
Cell : 9491199843

I N D E X

SECTION-I

ANDHRA PRADESH SOLAR POWER CORPORATION PVT. LTD.

TENDER NOTICE

APSPCL-e-E-15/2020-21/EE/ Tech./APSPCL, Dt.29.09.2020

1.	Department Name	Andhra Pradesh Solar Power Corporation Pvt Limited (**A J V Company Of Govt. Of Andhra Pradesh And Govt. Of India**)
2.	Circle/Division Name	Executive Engineer/Tech /APSPCL/Tadepalli, Guntur District
3.	Tender Notice No.	**APSPCL-e-E-15/2020-21/EE/ Tech./APSPCL, Dt.29.09.2020**
4.	Name of Work	APSPCL – Design, Engineering, Manufacturing, Supply, Supervision o erection, testing and commissioning of 8 Nos. 80MVA, 220/33kV Powe Transformers along with 2 set of spares for 220/33kV Pooling Stations- 2&3 at Kadapa Ultra Mega Solar Park (1000 MW), Mylavaram, Kadapa District A.P.
5.	Estimated Contract Value	Rs. 35,01,68,701/- (Rupees Thirty Five Crores One Lakhs Sixty Eight Thousand Seven Hundred and One Only) excluding GST.
6.	Period of Contract	Six months delivery period + Thirty months warranty period
7.	Performance Guarantee:	For a period of 30 months from date of receipt of material/equipment or 24 months from date of commissioning
8.	Form of Contract	Supply of Equipment
9.	Tender Type	Open Tender (e-platform)
10.	Tender Category	Works
11	Transaction Fee Payable to MD/ APTS payable at Vijayawada (including GST)	Rs.10,000/- (Rupees Ten Thousand Only)
12.	Bid Security (EMD)	Rs. 35,01,687/- @ 1% of the ECV
13.	Bid Security Payable to	By way of online payment through e-procurement portal
14.	Process Fee	Not Applicable
15.	Schedule Available Date & Time	29.09.2020, 5:00 PM
16.	Schedule Closing Date &Time	26.10.2020, 4:00 PM
17.	Bid Submission closing Date & time	26.10.2020, 5:00 PM
18.	Pre-Bid Meeting:	No Pre-bid Meeting (Online queries)

19.	Bid Submission	Online
20.	Bid Validity	180 days from the date of opening of Price bids.
21.	PQB or technical bid opening date	27.10.2020, 3:00 PM
22.	Price Bid e and Reverse Tendering Opening Date & Tim	29.10.2020, 11:00 AM
23	Eligibility Criteria	The bidder should be a manufacturer who must have designed, manufactured, tested and supplied to power utilities at least 40% of the tender quantity of the goods/equipment of same or higher voltage class and same or higher capacity rating as indicated in the "Schedule of Requirement" in one continuous period of 12 months in the last five years as on the date of opening of bid and its financial turnover during any one year of the last five years should have been equal or more than 100% value of the material now quoted. At least 20% of the similar material offered (same or higher voltage class and same or higher capacity rating) as indicated in the 'Schedule of Requirements' should be in successful operation since 2 years as on the date of opening of the Bid. The detailed Qualifying requirements are indicated in Section-VI **Responsibility for correctness of the information submitted in online bid lies with bidder. <u>If any information furnished in the bid is proved to be false at a later date, the bid will not only be rejected but the bidder will be BLACKLISTED.</u>**
24.	Place of Opening of Tenders	In the chambers of Executive Engineer/Tech/ APSPCL, Tadepalli, Guntur District -522 501
25.	Officer Inviting Bids	Executive Engineer/Tech/ APSPCL, Tadepalli, Guntur District, A.P. – 522 501
26.	Address & Contact details (E-mail id, Phone, Fax)	Executive Engineer/Tech/APSPCL, Flat No. 401, 4th Floor, Garuda Enclave, Beside T.G. Plaza, Tadepalli, Guntur District, A.P. – 522 501. E-Mail: apspcl@ap.gov.in , md.apspcl@ap.gov.in
27.	Procedure for bid submission	Procedure for Submission of Bids:- a) The Bids should be in the prescribed form, which can be obtained from e-procurement platform from the date of electronic publication up to the time and date indicated in the Bid notice. The intending bidders would be required to enroll themselves on the e-procurement market place tender.apeprocurement.gov.in. Those contractors who register themselves in the e-procurement market place can download the Bid schedules free of cost. The bidder shall authenticate the bid with his digital certificate for submitting the bid electronically on e-procurement platform and the bids not authenticated by digital certificate of the bidder will not be accepted on the e-procurement platform following the G.O.Ms.No.6, I.T&C Department, dated. 28-2-2005. For enrollment and Registration APTS, Vijayawada is to be contacted. b) Intending bidders can contact office of the Executive Engineer/

		Technical/APSPCL/ Tadepalli, Guntur District –522 501 for any clarification / information on any working day during working hours. c) The bidders who are desirous of participating in e-procurement shall submit their technical bid, price bid etc. in the standard formats prescribed in the Bid documents, displayed at e-market place. The bidders should invariably upload the statement showing the list of documents etc., uploaded in the e-market place in support of their technical bid. The bidder should load scanned copies of all the certificates, documents etc as called for here under. The bidder shall upload all the statements, documents, certificates duly signed by him, owning responsibility for their correctness / authenticity. d) Technical bid evaluation of the bidders would be done on the certificates/ documents furnished by the bidder against qualification criteria. a) The bidders shall invariably upload the scanned copy of receipt of online money transfer through RTGS/NEFT. The successful bidder shall furnish the original of the same either personally or through courier or by post within the stipulated time specified by the purchaser The bidder shall invariably upload the following i) Documentary evidence to establish the quantity supplied so far such as invoices , DCs, GST documents ii) Performance reports to meet the QR-performance iii) Documents in respect of financial turnover of last five years. iv) Type test reports v) Guaranteed technical Particulars, drawings etc The bidder shall furnish the declaration that: i) They have not been black listed in any department in A.P. due to any reasons. ii) They will agree to get disqualified themselves for any wrong declaration in respect of the above and get their Bid summarily rejected. iii) The soft copies uploaded by them are genuine. Any incorrectness/deviations noticed will be viewed seriously and apart from canceling the work duly forfeiting the Bid security, criminal action will be initiated including suspension of business and/ or black listing.
28	Procedure for Online Reverse Auction	**1. Reverse Tendering Process:** The following reverse tendering procedure will be followed as per G.O.MS.No: 67, WR(Reforms), Dept., Dt: 16.08.2019. a) All bidders shall self-declare their details under each technical and financial criterion on the e-procurement platform along with an undertaking confirming their compliance with the technical and financial criterion prescribed in the bid document and upload the same in the e-procurement website. b) All bidders shall submit supporting documents for their submittals under each technical and financial criterion. In case of documents found to be defective, incorrect or forged and

		therefore claim of qualification is not supported, severe action including forfeiture of EMD shall be taken. c) The Price bids of the qualified bidders shall be opened and the lowest quoted price bid among the qualified bidders in the tender process shall be determined. d) To conduct the reverse tender process at least two bidders would be required. e) If the number of bidders participated in initial tendering are more than five (05), 60% of the bidders participated in initial tendering (counting from the bidder who has quoted lowest initial price offer) or five(05) whichever is more will be allowed for reverse tendering. If the number of bidders participated are equal or less than five (05), all bidders will be allowed to participate in the reverse tendering. f) The L1 Price Offer (Initial) shall be the maximum allowable Bid price for the reverse tendering process. g) Only one round of reverse tendering shall be carried out in which bidders can revise their bids multiple times within the time limits specified. h) At the start of the Reverse Tendering process the Maximum Allowable Bid Price will be set and bidders shall submit their bids in an online platform. i) Names of the bidders / vendors shall be anonymously masked in the Reverse Tendering process and vendors will be given suitable dummy names. j) The initial period of the Reverse tendering process will start after 3 hours, following which there will be auto extensions of time by 15 minutes in case of any reduction in bids recorded in the prior 15 minutes. k) Only the current L1 bid shall be visible to all bidders who may revise their bids until the end of the process. l) Decrements made in each subsequent bid shall not be less than 0.5% of the IBM/ECV uploaded. m) The L1 bid may be determined following a period of inactivity of more than 15 minutes of reverse bidding after the initial 3 hour period after closure of the main bidding. n) Following the determination of the L1 bid, the L1 bidder's supporting documents under each technical and commercial criterion shall be verified. The reverse tendering process shall be

		on hold for a maximum period of 24 hours (1 day) while the L1 bidder's supporting documents are verified. o) Upon successful verification of the L1 bidder's supporting documents, the reverse tendering process shall be closed declaring the L1 bidder as "successful bidder" and the remaining bidders in the process shall be notified as "unsuccessful" and their respective EMDs shall be refunded. p) In case there are discrepancies between the L1 bidder's declarations under the technical and financial criteria and the supporting documents submitted, the L1 bidder shall be disqualified, his EMD shall be forfeited, he will be removed from the reverse tendering process and the remaining bidders shall be notified of the date and time when the reverse tendering process shall be resumed. q) The reverse tendering process shall be resumed with the L2 price as the Maximum Allowable Bid Price. r) Only 15 minutes shall be initially allowed for the remaining bidders to revise their bids, subject to automatic extensions of 15 minutes in case of any reduction in bids recorded in the prior 15 minutes. s) The reverse tendering process shall continue until the determination of a successful bidder.
29.	Statutory Requirements	The Tenderer shall fulfill the following statutory requirements. **a)** GST The tenderer should have registration under GST from concerned department. The rates are exclusive of GST. Applicable GST as on date will be allowed against submission of GST invoice.
30.	General Terms & Conditions**:**	Bid Notification - APSPCL Bid Notice No. **APSPCL-e-E-15/2020-21/EE/ Tech./APSPCL, Dt.29.09.2020** i) Bids are invited on the e-procurement platform for the above-mentioned procurement from the firms eligible. ii) Bid security. To be paid through online money transfer through RTGS/NEFT or Bank guarantee, issued from any Nationalized/Scheduled Bank to be valid for a period of 60 days over and above the validity of bid i.e. 150 days from the date of bid opening. Scanned copy of receipt of online money transfer through RTGS/NEFT towards Bid security shall be uploaded with the bids originals must be submitted by successful bidder to the Department through registered post / courier / in person before placing order . Exemption for payment of bid security is not allowed in any case . The permanent bid security bank guarantee accepted earlier is deemed to have been withdrawn . Permanent bid security bank Guarantee is not accepted. Bid security extensions accorded earlier

		are deemed to have been withdrawn. i) Bid schedules: Bid schedule can be downloaded free of cost from the web site tender.apeprocurement.gov.in ii) The bidder is subject to be disqualified, if he is found to have mislead or furnished false information in the forms / Statements / Certificates submitted in proof of qualification requirements and any record of abandoning of work, not fulfilling contractual obligations in earlier contracts, inordinate delays in completion of works, litigation history, Financial failures or participating in the previous Bidding for the same work and quoting unreasonably high price. iii) Even while execution of the contract, if it is found that the bidder had produced false/fake certificates of experience, he will be black listed and the contract will be terminated and his Bid security will be forfeited and contract will be carried through other agency at his cost and risk.. a) Transaction fee: The participating bidders have to pay transaction fee of 0.03% on Estimated Contract Value (ECV) with a cap of Rs 10000/- (Rupees ten thousands only) for all tenders with ECV upto Rs. 50 Crores plus service charges @18%, and Rs.25000/-(Rupees Twenty Five thousand only) plus service charges @18% for tenders with Estimated Contract Value (ECV) above Rs.50.00 crores on line payment gateway with any master/visa credit card issued by any Bank and through net Banking facility(direct debit) with AXIS/ICICI or HDFC Banks at the time of bid submission. Submission is mandatory as per GO Ms No.13. Payment of transaction fee through DD will not be accepted". b) Corpus Fund: The successful bidder shall pay an amount equivalent to 0.04% of ECV (estimated contract value) with a cap of Rs. 10,000 (Rupees ten thousand only) for all tenders with ECV upto Rs. 50 Crores and Rs.25000/- (Rupees Twenty Five thousand only)for tenders with ECV above Rs.50.00 crores on e-Procurement platform before entering into agreement/issue of purchase orders, towards e-Procurement fund in favour of Managing Director, APTS, Vijayawada through the Agreement authority. iv) In case of discrepancy with Bid conditions in the Bid document and NIT, the condition in the Bid document prevails. **Note:** a) Any other condition regarding receipt of Bids in conventional method appearing in the Bid documents may please be treated as not applicable. b) The contractors are to upload the information preferably in Zip format. c) The contractors should upload the documents duly singing each and every paper.
31.	Documents to be submitted (Hard copies) to the Tender	The tenderer is liable for disqualification, if he is found to have mislead or furnished false information in the Forms / Statements / Certificates submitted in proof of qualification requirements and

	inviting authority*	record of performance such as abandoning of work, not properly completing of earlier contracts, inordinate delay in completion of works, litigation history, Financial failures and/or participated in the previous tendering for the same work and has quoted unreasonably high price, etc. Even while execution of the work, if found that the contractor had produced false/fake certificates of experience, he will be black listed, the contract will be terminated and his Bid security will be forfeited and work will be carried out through other agency at his cost and risk. **The tenderer shall furnish the declaration that:** 1) They have not been black listed in any department due to any reasons. 2) They have not been demoted to lower category in any department for not filing the tenders after buying the tender schedules in a whole year and their registration have not been cancelled for a similar default in two consecutive years. 3) They will agree to get disqualified themselves for any wrong declaration in respect of the above and get their tender summarily rejected. 4) The soft copies uploaded by them shall be genuine. Any incorrectness / deviation noticed will be viewed seriously apart from canceling the work duly forfeiting the Bid security. Criminal action will be initiated including suspension of business and/ or black listing.
32.	Other relevant information	• APSPCL reserves the right to reject any or all the tenders without assigning any reasons thereof. • APSPCL reserves the right to amend or modify the tender and its conditions before 20.10.2020 (The details will be updated in APSPCL web site) • Any other condition regarding receipt of tenders in conventional method appearing in the tender documents may please be treated as not applicable. • The contractors have to upload the information preferably in Zip format. • The contractors should upload the documents duly signing each and every paper. For all clarifications & guidance, the bidders may contact the Executive Engineer/Tech/ APSPCL/ Tadepalli, Guntur District – 522 501.

Sd/xxx
Executive Engineer/Technical

To
The Bidders through Notice Board / Web Publication.

Copy to the:

1) Notice Board.
2) The Dy.CCA/ APSPCL, Tadepalli, Guntur District for information.
3) The Superintending Engineer/Civil/APSPCL, Tadepalli for information.
4) The Dy.Executive Engineer/Electrical/APSPCL, Kadapa for information.
5) The Project Manager/APSPCL, Ananthapuramu for information.

Corrigendum-1 for Tender Specification APSPCL-e-E- 15/2020-21/EE/Tech/APSPCL, Dt.29.09.2020. Clarification for the quarries raised by various bidders

Sr. No.	Category	Tender Descriptions	Clarification Needed by the bidders	Remarks / Replies
1	Bid Validity Section-I Cl.No.20	Bid Validity:180 days from the date of opening of Price bids	Confirm the bid validity	Bid Validity is 180 days from the date of opening of Price bids.
2	Bid Validity Section III Cl.No.21.1	Period of Validity of Bids: Bids will remain valid for the period of One Eighty (180) days from the date of bid opening prescribed by the purchaser		
3	Bid Validity Form-7 Sr.No.15	State whether 90 days validity offered		
4	Bid Security Section-I, Cl.No.30	General Terms & Conditions: Bid Security to be validity for a period of 60 days over and above the validity of bid i.e. 150 days from the date of opening.	Confirm the Bid Security Validity	Bid Security (EMD) is to be validity for a period of 60 days over and above the validity of bid i.e. 180 days from the date of opening.
5	Bid Security Proforma for Self Declaration, C.l.No.5.e	Payment of EMD for an amount of Rs. 35,01,687/- by way of online payment (Validity shall be 60 days over and above bid validity i.e 150 days from the date of bid opening)		
6	Payment of Bid Security, Section-I Cl.No.13	Bid Security Payable to: By way of online payment through e-procurement portal	We will submit BG for EMD as per Bid Security Form.	Bid security (EMD) has to be paid by way of online payment through e-procurement portal only. The Bid security (EMD) will be refunded to the unsuccessful bidders immediately after awarding of work.
7	Payment of Bid Security: Section-I, Cl.No.30	General terms & Conditions: Bid security to be paid through online money transfer through RTGS/NEFT or Bank Guarantee, issued from any Nationalized / Scheduled Bank to be valid for a period of 60 days over and above the validity of bid i.e. 150 days from the date of bid opening		
8	Payment of Bid Security:	Payment of EMD for an amount of Rs. Rs.35,01,687/- by way of online payment (Validity shall be 60 days over and above bid validity i.e. 150 days from the date of bid opening)		
9	Payment of Bid Security:	Bid Security: The Bidder shall furnish, as part of its bid, a Bid Security for an amount specified in NIT. The bidder may furnish online money transfer through RTGS/NEFT in orginal as per proforma attached		

10	Delivery Schedule Section-IV	Delivery Schedule: Supply 8 No. transformers within Six months from the date of issue of letter of intent	Based on COVID-19 pandemic situation and Quality aspects, we are suggesting the delivery schedule as "Supply 2 Nos. transformers within Eight months from the date of issue of Letter of intent and @2NOs. per month thereafter".	Transformers have to be supplied as per tender specification.
11	Technical Specification Section-V	Tap Changing gear i) Type- On load ii) Provided on – 220kV side iii) Tap range – 5% to -25% iv) Tap step – 1.25%	Based on previous tender floated by APTRANSCO, tapping range for all voltage class transformer was +10% to -10% in steps of 1.25%. Confirm the tap range as per APTRANSCO specification as enclosed	Tender was floated as per existing transformer technical specification in Kadapa Solar Park. Hence, the technical specification of transformer will remains the same as per tender specification.
12	Technical Specification	Core Building Factor	Based on previous tender floated by APTRANSCO, building factor shall be 1.1. We are suggesting to incorporate the same in subjected Tender also	
13	Technical Specification	Load Losses	Based on previous tender floated by APTRANSCO and CEA recommendations, limits on Stray + Eddy losses are as follows: 12R loss – 85% of total load loss Eddy+Stray loss-15% of total load loss We are suggesting incorporating the subjected Tender also.	
14		Due date for bid submission is 26.10.2020	We also request for tender due date extension by another TWO weeks' time period from receipt of Bid Security to be paid in the form of Bank Guarantee confirmation, enabling us to apply for Bid Security BG.	As per Bid documents only.
15			Please confirm whether any Hard copy of documents need to be submitted or not, as tender called doesn't specify any hard copy documents need to be	As per tender specification, all the participating bidders have to submit the scanned copies of documents in e-

			submitted	procurement platform while uploading tender. The successful bidder has to submit original hard copies of documents.
16	Section-II (A) Eligibility Criteria Cl.No.3.5	Note: The above eligibility criteria (A,B &C) shall be fulfilled by the bidder against each lot separately for the lots the Bidder has quoted.	As per 3.5 of Note: The above eligibility criteria (A,B & C) shall be fulfilled by the bidder against each lot separately for the lots the bidder has quoted. As tender is called in 1 lot, we understand it is not applicable.	As per tender specification, 8 Nos. 80 MVA, 220/33kV Power Transformers along with 2 sets of spares has to be supplied within Six months.
17			GST Number of APSPCL for making the EMD payment.	APSPCL GST registration number is 37AANCA1152F1ZV. Bid security (EMD) has to be paid by way of online payment through e-procurement portal only and GST number may not be required for paying EMD.
18	**<u>Additional Scope</u>**: **Design, Supply, Erection, Testing and Commissioning of Nitrogen Injection System for Prevention against the transformer explosion for 8 Nos. 80 MVA, 220/33kV Power Transformers. (Detailed technical specification along with GTP is attached)**			

TECHNICAL SPECIFICATION

Scope of Work: Turnkey contract for the work of design, supply, erection and commissioning of Nitrogen Injection system for prevention against the transformer explosion for 220kV class, 80 MVA transformers.

Each oil filled transformer shall be provided with a dedicated Nitrogen Injection system for prevention against the transformer explosion which shall use nitrogen as quenching medium. The system shall prevent transformer oil tank explosion and possible fire in case of internal / external cause. In the event of fire by external causes- such as bushing fire. OLTC fires, fire from surrounding equipment etc, it shall act as a fast and effective fire fighter. It shall accomplish its role as fire preventer and extinguisher. Fire shall be extinguished within 3 minutes (Maximum) of system activation and within 30 seconds (maximum) of commencement of nitrogen injection. The systems shall comply Central Board of Irrigation and Power technical specifications. The system shall be designed, manufactured in successful operation in Indian government installations for at least 5 years for protection of transformers. The list of past supplies with minimum 10 testimonials issued by end user shall be submitted for approval. The list of past supplies in India along with performance certificate from users of the system shall be submitted for approval of purchaser.

Standards and Codes

All the equipment of NIFPS shall comply with the latest edition of the following standards and codes including amendments.

Standard	Description
IS 7285-2	Refillable Seamless Steel Gas Cylinders - Specification Part 2: Quenched and Tempered Steel Cylinders With Tensile Strength Less Than 1100 MPa (112 kgf/mm^2)
CEA Technical Standards for Construction of Electrical Plants and Electric Lines Regulations, 2010 with 2015 amendment	
CEA Measures relating to Safety and Electric Supply Regulations, 2010 with 2015 amendment.	
CBIP Manual on Transformers, Publication No. 317	

1.1 Activation of the system

Mal-functioning of the Nitrogen injection system could lead to interruption in power supply. The supplier shall ensure that the probabilities of chances of malfunctioning of the Nitrogen injection system are practically zero. To achieve this objective, the supplier shall

plan out his scheme of activating signals which should not be too complicated to make the system inoperative in case of actual need. The system shall be provided with automatic controls to prevent the explosion of transformers. Besides automatic control, remote electrical switch control at Control box and local manual control in the cubicle shall also be provided. The following electrical-signals shall be required for activating the system under prevention mode / fire extinguishing mode.

Auto Mode

For prevention:

- Differential relay operation AND
- Buchholz surge relay paralleled with pressure relief valve or RPRR (Rapid Pressure Rise Relay) AND
- Tripping of all circuit breakers (on HV &LV/IV side) associated with transformer is the pre-requisite for activation of system.

For extinguishing:

- Fire Detector AND
- Buchholz surge relay paralleled with pressure relief valve or RPRR (Rapid Pressure Rise Relay) AND
- Tripping of **all** circuit breakers (on HV &LV/IV side) associated with transformer is the pre-requisite for activation of system.

Manual Mode (Remote)

- Tripping of all circuit breakers (on HV &LV/IV side) associated with transformer / reactor is the pre-requisite for activation of system AND
- Operation of remote electrical switch by breaking glass

Manual Mode (Mechanical)

- Tripping of all circuit breakers (on HV &LV/IV side) associated with transformer / reactor is the pre-requisite for activation of system.

The system shall be designed to be operated manually in case of failure of power supply to the system

1.2 General description

Nitrogen Injection system should be a dedicated system for each oil filled transformer. It should have a Fire Extinguishing Cubicle (FEC) placed on a plinth at a distance of 6-10

m away from transformer or placed next to the firewall (if fire fighting wall exists). The FEC shall be connected to the top of transformer oil tank for depressurization of tank and to the oil pit. (capacity is approximately equal to **10%** of total volume of oil in transformer tank/or existing oil pit) from its bottom through oil pipes. The FEC should house a pressurized nitrogen cylinder(s) which is connected to the oil tank of transformer/reactor oil tank at bottom. The Transformer Conservator Isolation Valve (TCIV) is fitted between the conservator tank and Buchholz relay. Cable connections are to be provided from signal box to the control box in the control room, from control box to FEC and from TCIV to signal box. Detectors placed on the top of transformer tank are to be connected in parallel to the signal box by Fire survival cables. Control box is also to be connected to relay panel in control room for receiving system activation signals.

1.3 Operation

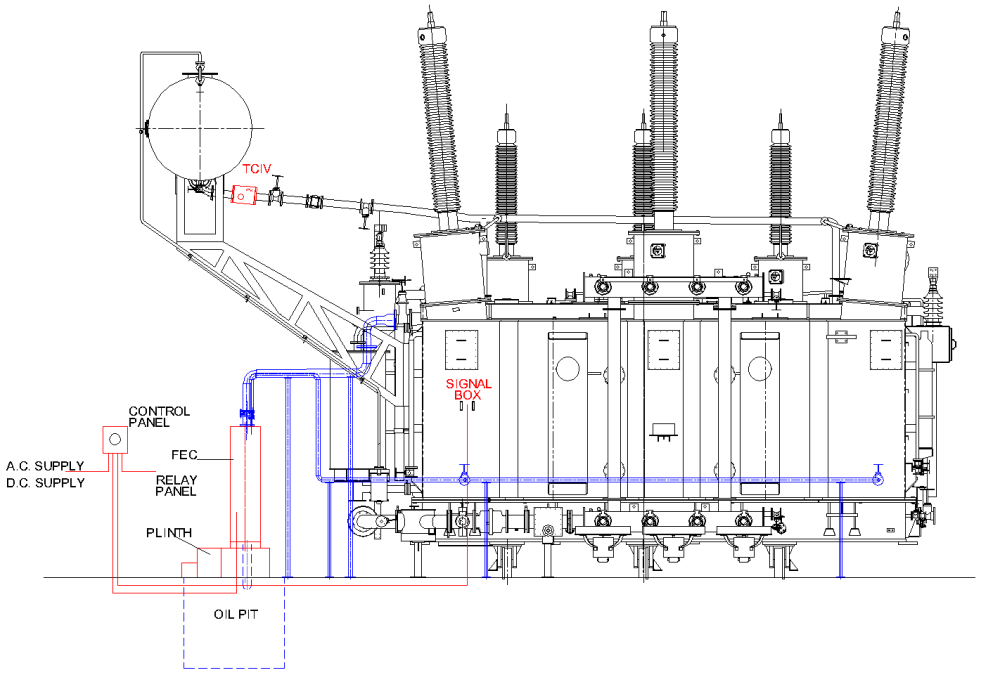
On receipt of all activating signals, the system shall drain pre-determined volume of hot oil from the top- of tank (i.e. top oil layer), through outlet valve, to reduce tank pressure by removing—top oil and simultaneously injecting nitrogen gas at pre determined pressure for stirring the oil at pre-fixed rate and thus bringing the temperature of top oil layer down. Transformer conservator isolation valve blocks the flow of oil from conservator tank in case of tank rupture / explosion or bushing bursting. Nitrogen occupies the space created by oil drained out and acts as an insulating layer over oil in the tank and thus preventing aggravation of fire.

1.4 System shall have following characteristics :

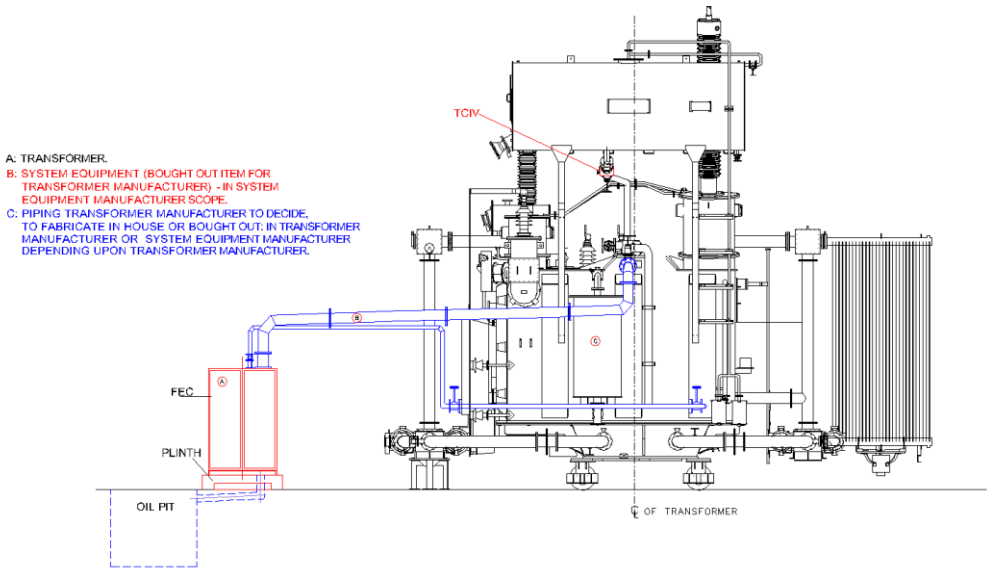
- System shall operate in automatic, remote and manual mode in the event of power failure.
- System shall have provision of testing on live transformers to ensure healthiness at all times.
- System shall have interlock to ensure operation of system only after transformer electrical isolation to avoid nitrogen injection in energized transformer.
- System shall have mechanical locking arrangement for nitrogen release system as well as oil drain to avoid unnecessary operation during maintenance and /or testing of the transformer and /or system.
- System shall have provision to monitor nitrogen injection pressure as well as cylinder pressure.
- Pressure monitoring switch for back-up protection for nitrogen release as redundancy to first signal of oil draining commencement for Nitrogen release shall be provided.
- System shall have individual mechanical release devices provision for oil drain and nitrogen release to operate manually in case of operation DC supply failure.
- Nitrogen release scheme shall be designed in such a way that the nitrogen gas shall not enter the energised transformer tank even in case of passing/leakage of valve.

- Individual system component/equipment should not have working voltage other than Station DC Voltage.AC-DC/DC-DC converter shall not be used for reliable operation.

Schematic diagram of Nitrogen Injection system, is shown in Fig.1



Pipe layout of Nitrogen Injection system to be provided by transformer manufacturer is shown in Fig.2



2.0 System components

Nitrogen Injection system shall broadly consist of the following components. However, all other components which are necessary for fast reliable and effective working of the system shall deemed to be included in the scope of supply.

2.1 CUBICLE (FEC)

The FEC frame shall be made of CRCA sheet of 3 mm (minimum) thick complete with the base frame, painted inside and outside with post office red colour (shade 538 of IS-5). It shall have hugged / hinged split doors fitted with high quality tamper proof lock. The doors, removable covers and panels shall be gasketted all round with high quality gaskets. The degree of protection shall be atleast IP55. The following items shall be provided in the FEC.

- Nitrogen gas cylinder with regulator and falling pressure electrical contact manometer.
- Oil drain pipe with mechanical quick drain valve.
- Electro mechanical control equipment for draining of oil of pre-determined volume and injecting regulated volume of nitrogen gas
- Pressure monitoring switch for back-up protection for nitrogen release
- Limit switches for monitoring of the system
- Butterfly valve with flanges on the top of panel for connecting oil drain pipe and nitrogen injection pipes for transformer.
- Panel lighting (LED Type)
- Oil drain pipe extension of suitable sizes for connecting pipes to oil pit.
- Nitrogen release scheme shall be designed in such a way that nitrogen gas shall not enter the energized transformer tank even in case of passing / leakage of valve.
- The oil drain pipe inside the FEC shall have oil leakage detection arrangement for detecting oil leakage from drain valve.
- Provision for indication and alarm should also be provided on detection of oil leakage from oil drain valve located in FEC.

2.2 Control box

Control box is to be placed in the control room for monitoring system operation, automatic control **and** remote operation. The following alarms, indications, switches,

push buttons, audio signal etc. shall be provided.

- System on
- **TCIV open**
- **Oil drain valve closed**
- Gas inlet valve closed
- TCIV closed
- Detector trip
- Buchholz relay trip
- Oil drain- valve open
- Extinction in progress
- Cylinder pressure low
- Differential relay trip
- PRV / RPRR trip
- Transformer trip
- System out of service
- Leakage from drain pipe
- Fault in cable connecting fault detector
- Fault in cable connecting differential relay
- Fault in cable connecting Buchholz relay
- Fault in cable connecting PRV / RPRR
- Fault in cable connecting transformer /reactor trip
- Fault in cable connecting TCIV
- Auto/ Manual / Off
- Extinction release on / off
- Lamp test
- Visual/ Audio alarm
- Visual/ Audio alarm for DC supply fail

Control box shall be designed to receive DC source 1 and DC source 2 with auto changeover facility. Potential free contact shall be provided for system monitoring as below:
a. System operated
b. DC supply fail
c. System out of service

2.3 Transformer Conservator Isolation Valve

Transformer conservator isolation valve(TCIV) to be fitted in the conservator pipe line, between conservator and buchholz relay which shall operate for isolating the

conservator during abnormal flow of oil due to rupture / explosion of tank or bursting of bushing. The valve shall not isolate conservator during normal flow of oil during filtration or filling or refilling, locking plates to be provided with handle for pad locking. It shall have proximity switch for remote alarm and indication glass window for visual inspection similar to bucholz glass inspection window for physical checking of the status of valve. The TCIV should be of the best quality as malfunctioning of TCIV could lead to serious consequence. The closing of TCIV means stoppage of breathing of transformer. The degree of protection shall be IP67.

2.4 Fire Detectors

The system shall be complete with adequate number of detectors (quartz bulb) fitted on the top cover of the transformer oil tank, OLTC rated for 141°C for heat sensing each fitted with two no. cable glands (water proof/weather proof) . The degree of protection shall be IP 65. Fire detector should be all weather type and the performance of Fire detectors should not deteriorate during wet weather condition.

2.5 Signal box

It shall be mounted away from transformer main tank, preferably near the transformer marshalling box, for terminating cable connections from TCIV & detectors and for further connection to the control box. The degree of protection shall be IP65.

2.6 Cables

Fire survival cables (capable to withstand 750° C.) of 4 core x 1.5 sq. mm size for connection of detectors in parallel, control signals and between signal box/ marshalling box to transformer conservator isolation valve connection on transformer shall be used. The fire survival cable shall Conform to relevant International / Indian standards.

Fire Retardant Low Smoke (FRLS) cable of 12 core x 1.5 sq. mm size shall be used for connection of signal box / marshalling box near transformer/reactor and FEC mounted near transformer with control box mounted in control room.

Fire Retardant Low Smoke (FRLS) cable of 4 core x 1.5 sq. mm size shall be used for connection between control box to DC and AC supply source, FEC to AC supply source, Cables from Fire Extinguishing Cubicle towards control room shall be laid in cable trench / metal pipes, away from transformer and shall not pass through transformer area.

2.7 Pipes

Heavy duty ERW pipe connecting the transformer tank for oil drain and for nitrogen injection shall be provided. Pipe connecting oil pit / tank laid underground shall be galvanized, medium duty shall be provided. Pipes, complete with supports, connections, flanges, bends and tees etc. shall be supplied along with the system.

2.8 Other items

(a) Oil drain and nitrogen injection openings with gate valves on transformer tank at suitable locations.

(b) Flanges between Buchholz relay and conservator tank for fixing TCIV.

(c) Detector brackets on transformer / reactor tank top cover.

(d) Spare potential free contacts for activating the system i.e. in differential relay, Buchholz relay, Pressure Relief Device / RPRR, Circuit Breaker of transformer/reactor

(e) Pipe -connections between transformer and FEC and between FEC and oil pit required for collecting top oil.

(f) Cabling for detectors mounted on transformer top cover

(g) Inter cabling between signal box, control box and FEC.

(h) Supports, signal box etc. which are to be painted with enameled paint.

3.0 Technical particulars

Parameter	Specification
Fire extinction period from commencement of nitrogen injection	30 second (maximum)
Total time duration to bring oil temperature below flash point	30 minute (maximum)
Fire detector quartz bulb heat sensing temperature	141°C
TCIV setting for normal operation to ensure no obstacle for transformer breathing	40 litre per minute
TCIV setting for operation during abnormal flow of oil	60 litre per minute
Capacity of nitrogen gas cylinder for 80 MVA transformer	Minimum 68 litre water capacity, 10 m3 gas at pressure of 150 kg/cm2 upto 60000 liters oil capacity of transformer tank and 20 m^3 gas at pressure of 150 kg/cm2 above 60000 litres oil capacity of transformer tank

4. 0 Power supply

For Control Box	220V/ 110 V DC / As per substation DC voltage (DC-DC/ AC-DC converters shall not be used for reliable operation)
For FEC for lighting and heating	230V AC

5. 0 MODIFICATIONS ON THE TRANSFORMER

5.1 No modification is allowed in transformer design like additional opening on transformer top cover, drilling of holes, welding on transformer tank or inserting any kind of component or sensor in transformer tank, which affects in performance , safety etc or its any other useful parameter of transformer. This requirement shall be paramount importance and shall form essence of this contract. No new openings shall be made on the transformer tank. However, in any case, performance of transformer should not be affected in any manner as brought out above and the supplier shall give an undertaking to this effect along with past performance report for similar job executed. High level of cleanliness during installation & commissioning shall be maintained. All pipes should be washed/rinsed with transformer oil (to be supplied by enduser , wherever required for draining/filling/rinsing/washing).

4.2 It shall be solely the responsibility of supplier to install, carry out pre-commissioning tests & commission of NIFPES to the complete satisfaction of the purchaser and/or his representative.

5.0 WORKMANSHIP

The material offered shall be of best quality and workmanship. The responsibility for procurement of quality raw material shall be solely of supplier and in no case any assistance for the procurement of material shall be provided by the Purchaser and the delivery programme shall not be affected due to non supply of raw material. Therefore, the supplier will have to ensure adequate quantity of quality raw material in his stock so that the progress of work is not hampered. No extension in delivery period will be allowed on the pretext of non-availability or short supply of raw material and this shall not constitute a valid reason of force majeure. The material shall conform to the relevant Indian/International Standards and wherever applicable, the relevant Standard shall be mentioned. To the extent possible, various parts of NIFPES meant for various transformers shall be interchanged.

7.0 PACKING & FORWARDING

The Supplier shall be required to pack and protect the material securely so as to avoid damage in transit. The Supplier shall insure material for all losses or damage caused in transit etc.

8.0 SCOPE OF WORK OF PURCHASER :

a) 110V DC /220V DC / substation DC, power Supply for control box and 230V AC for F.E.C and control box.

b) Power supply for welding and other related facilities including water supply during installation.

SPARES FOR THREE (3) YEARS OPERATION & MAINTENANCE

The bidder apart from the below mentioned spares shall submit a list of recommended spares for three years trouble free operation of the equipments and also furnish unit rates. The owners will securitize the said list and decide on the items on spares to be ordered and the quantities. These spares shall be supplied by the contractor before end of guarantee period. The owner reserves right to order the spares within twelve (12) months from the date of order for main equipments and the rate shall be kept valid till this date. The prices of these spares shall not be considered for evaluation of the bid.

Mandatory Spares

Cylinder filled with Nitrogen of required capacity per substation	1 No.
Fire Detectors per transformer	3 Nos.
Regulator assembly per sub-station	1 No.

Tests

Reports of type test conducted as per relevant IS/IEC standards in respect Of various bought out items including test reports for IP55 degree of protection for FEC / control box / signal box from NABL approved Laboratory or government agency any other reputed authority nationally or internationally not older than 7 years & must be valid till expiry of validity of offer shall be submitted by the supplier.

The supplier shall demonstrate the functional test associated with the following as Factory Acceptance Tests :

- FEC, Control Box. Transformer Conservator Isolation Valve

The performance test of the complete system shall be carried out after erection of the system with transformer at site.

Detailed layout drawings, equipment drawing along with 4 sets of Operation arid Maintenance manual along with soft copies (in CDs) shall be submitted by the supplier along with the consignment.

GUARANTEED TECHNICAL PARTICULARS FOR NITROGEN INJECTION FIRE PREVENTION AND EXTINGUISHING SYSTEM FOR 220KV CLASS 80 MVA TRANSFORMERS.

Sr. No.	Description	APSPCLrequirment	Manufacturer Guaranteed Particulars
1	Name of Manufacture and country of origin		
2	Reference standards	APSPCL SPECIFICATION, CBIP-317	
3	Details of system equipments		
3.1	**Fire Extinguishing Cubicle (FEC)**		
3.1.1	Dimensions(LXBXH)mm	Manufacturer to specify	
3.1.2	Weight	Manufacturer to specify	
3.1.3	Colour shade	Post office red as per IS 5 : 538	
3.1.4	Degree of protection minimum IP 55	Minimum IP55	
3.1.5	Capacity of Nitrogen cylinder	68 litre water capacity, 10 Cubic Meter filled at 150 kg/ sq.cm. pressure	
3.1.6	Number of cylinders	Minimum 1	
3.1.7	Pressure for Nitrogen filling	150kg/cm^2 Maximum	
3.1.8	Minimum distance of FE cubicle from the transformer	6 to10 meters or place next to fire wall if fire wall exists.	
3.1.9	Method of mounting	Floor	
3.1.10	N2 scheme design in such a way that N2 shall not inter in transformer tank even in case of passing/leakage of valve	Shall be provided	
3.1.11	Venting arrangement in N2 scheme for excess pressure of nitrogen injection	Shall be provided	
3.1.12	Provision of mechanical locking for oil release unit	Shall be provided	
3.1.13	Provision of mechanical locking for Nitrogen release unit	Shall be provided	
3.1.14	Installtion	Outdoor	
3.1.15	Detection of Oil leakage/seepage from drain pipe in FEC and visual/audio alarm provided.	Shall be provided	
3.1.16	Mechanical release device for oil drain in case of failure of substation DC supply	Shall be provided	
3.1.17	Mechanical release device for Nitrogen release in case of failure of substation DC supply	Shall be provided	
3.1.18	Whether the following items are provided in FEC. If so furnish make, type & other details.		
3.1.18.1	Contact manometer	Falling pressure, SS Internal, Electrical contact.	
3.1.18.2	Pressure Regulator suitable for 150 kg/ sq.cm. pressure	With safety relief valve for higher temperature compensation	
3.1.18.3	Pressure guage for nitrogen injection pressure	SS internal.	
3.1.18.4	Oil Release Unit make and suitable to operate without power	Suitable to operate without power and also on substation DC voltage.	
3.1.18.5	Gas Release Unit make and suitable to operate without power	Suitable to operate without power and also on substation DC voltage.	
3.1.18.6	Oil drain assembly	Transperent inspection window shall be provided	
3.1.18.7	Pressure monitoring switch as backup for nitrogen release	With arrangment to test at factory and site.	
3.1.18.8	Limit Switch No of contacts & spare contacts (NO&NC)	For system monitoring	
3.1.18.9	Oil drain valve (ABOVE FEC)	Shall be provided	
a	Make	Manufacturer to specify	
b	Type	Butterfly valve	
c	Size	125 NB	
d	Type of metal	Mild steel / cast iron	
3.1.19.10	Nitrogen Injection Valve (ABOVE FEC)	Shall be provided	
a	Make	Manufacturer to specify	

Sr. No.	Description	APSPCLrequirment	Manufacturer Guaranteed Particulars
b	Type	Round flange, Lockable, Stem rising	
c	Size	25NB	
d	Type of metal	Gun metal	
3.1.19.11	Oil drain pipe with flexible bellow	Shall be provided	
a	Size	125 NB	
b	Length	As per site location, Transformer to FEC & FEC to Oil Pit.	
c	Material	MS,ERW, Heavy duty for TRS to FEC & GI, Medium for FEC to Oil pit.	
3.1.19.12	Nitrogen injeciton pipe with flexible bellow	Shall be provided	
a	Size	25 NB	
b	Length	As per site location. Transformer to FEC.	
c	Material	MS,ERW, Heavy duty.	
3.2	**Control Box**		
3.2.1	Dimensions(LXBXH)mm	Manufacturer to specify	
3.2.2	Weight	Manufacturer to specify	
3.2.3	Colour shade	Post office red as per IS 5 : 538	
3.2.4	Degree of protection minimum IP 55	Minimum IP 55	
3.2.5	Details of components provided in the control box	MCB, Hooters, Contactors, Indicating lamps, Operating switches, Latch contactor	
3.2.6	Method of mounting	Wall/Frame	
3.2.7	Location	In control room.	
3.2.8	Whether audio and visual alarms provided?	Yes with different volume (dB) levels	
3.2.9	Suitable to receive two DC feeders with auto changeover facility	Suitable to receive dual substation DC supply with auto changeover.	
3.3	**Transformer Conservator Isolation Valve (TCIV)**		
3.3.1	Make	Manufacturer to specify	
3.3.2	Type : Mechanical	Operating mechanically on Transformer oil flow rate without using spring type mechanism.	
3.3.3	Colour shade	Post office red as per IS 5 : 538	
3.3.4	Degree of protection	IP 67	
3.3.5	Location	In the conservator pipe line on between Conservator and Buchholz relay.	
3.3.6	Whether suitable for pipe of size 80mm dia	Shall be provided	
3.3.7	No of contacts & spare contacts (NO&NC)	1NO,Electrical supply used only for indication.	
3.3.8	Padlocking provision	Yes. For service position and filling / refilling / filtration position.	
3.3.9	Visual position indicator for inspection	Yes. Transperent window provided similar to buchholz relay.	
3.4	**Fire Detectors**		
3.4.1	Make	Manufacturer to specify	
3.4.2	Type	Quartz bulb, Heat sensing.	
3.4.3	Degree of protection	IP 65	
3.4.4	Quantity required	Manufacturer to specify	
3.4.5	Method of fixing	Bolting on bracket on transformer top cover.	
3.4.6	Temperature recommended for effective heat sensing	141°C	
3.4.7	Number of NO contacts	2 NO,Suitable for substation DC voltage	
3.4.8	Necessity and condition of refilling	After operation	
4	**Power Supply**		
4.1	Control box	110 VDC /220 VDC/SUBSTATION DC SUPPLY and 230VAC for DC supply supervision and alarm.	
4.2	FEC (lighting and anti condensation heating)	230 VAC	

Sr. No.	Description	APSPCLrequirment	Manufacturer Guaranteed Particulars
5	Online test facility to test on energized transformer	Shall be provided	
6	**Fire Extinction period**		
6.1	On system activation	Maximum 3 minutes	
6.2	On commencement of Nitrogen injection	Maximum 30 Seconds	
7	Certificates testimonial of satisfactory operation during fault.	Shall be provided	
8	Any other information not covered above.	Manufacturer to specify	